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International Symposium on Time and Frequency

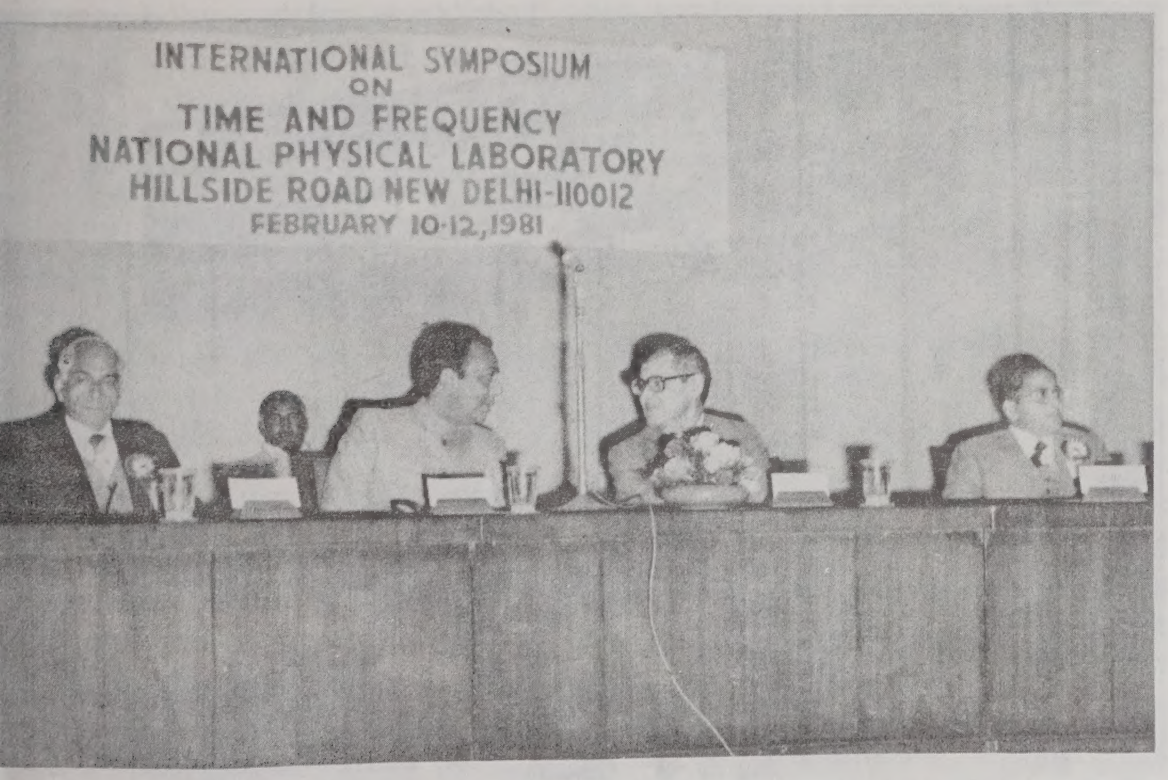
National Physical Laboratory L), New Delhi, in cooperation with nternational Bureau of Time (BIH), , and several other international national organizations organized a posium on Time and Frequency at during 10-12 February 1981. More 190 delegates including 40 foreign gates from 20 countries cipated.

ne 80-odd papers, including 30 from ad, that were presented during the posium discussed: cooperation veen developing and developed res of time and frequency; re- nship of developing and remote res with BIH and International io Consultative Committee (CCIR); ise global time transfer techniques; time and frequency standards; steering and coordination of time scales; and standard time services of India., While the delegates from the developing countries reported the efforts to establish time and frequency standards and the problems faced by them, the delegates from the developed world presented state-of-the-art reports in time and frequency metrology. Important among the topics dealt with were : global time synchronization to nanosecond accuracy using laser beams and geostationary satellites; time dissemination via navigational satellites—global positioning system and navy navigation satellite system; development and use of high-stability clocks in space; hydrogen masers; international atomic time scale; very long baseline interferometry; and applications of time and frequency standards to geodesy.

NPL contributed 12 papers which dealt the experiments with the Franco-German satellite Symphonie, including those carried out between NPL and PTB (FRG); linking of UTC (NPL) with UTC of corresponding organizations in other countries via GBR (UK) 16 kHz signals; observations during total solar eclipse of 16 February 1980; atomic time scale formation at NPL; NPL high frequency standard time broadcast; national calibration services provided by NPL; satellite receiver, stabilized laser and crystal oscillator development work at NPL.

Papers from other Indian organizations dealt with utilization of NPL-provided time services; use of the projected Indian domestic satellite INSAT; development of time and frequency technology in India; clock synchronization experiments with laser ranging and geosynchronous satellites in collaboration with the European Space Agency; and radio astronomy experiments in India..

Shri C.P.N. Singh, Minister of State for Science & Technology and Electronics, who inaugurated the symposium, pointed out in his address the importance of time and frequency metrology in solving many present-day communication and navigational problems. Shri Singh expressed satisfaction



ed on the dais during the International Symposium on Time and Frequency are (*from left*): Dr A.R. ma, Director, NPL; Shri C.P.N. Singh, Minister of State for Science & Technology and Electronics; Dr B. Guinot, Director, BIH; and Dr B.S. Mathur, Scientist, NPL

Inside

at the progress made in the country and mentioned that India would soon be using the Indian domestic satellite INSAT for standard time services meant not only for Indian users but also for those from the neighbouring countries.

In his presidential address, Dr B. Guinot, Director of BIH, mentioned that this was the first time that such an international symposium had been organized in this part of the globe. He expressed happiness at the active participation of developing countries in the symposium.

The NPL's Director Dr A.R. Verma, in his welcome address, appreciated the timely organization of the symposium, especially because of a growing consciousness for establishing improved metrological services in India and other developing countries. Owing to the radiowave character, time and frequency standards had assumed a regional significance as well, Dr Verma added.

The NPL scientists associated with the time and frequency project discussed with their foreign counterparts a number of collaborative projects. These included: High-accuracy global time and frequency transfer experiments with space shuttle (Smithsonian Astrophysical Observatory, USA); Flying atomic clock time intercomparisons (US Naval Observatory, and Instituto Electrotechnico Nazionale, Italy); Laser synchronization of atomic clocks from stationary orbits using geosynchronous satellites (European Space Agency and Indian Space Research Organisation); and Experiments with navigational satellites GPS and NNSS (National Bureau of Standards, USA).

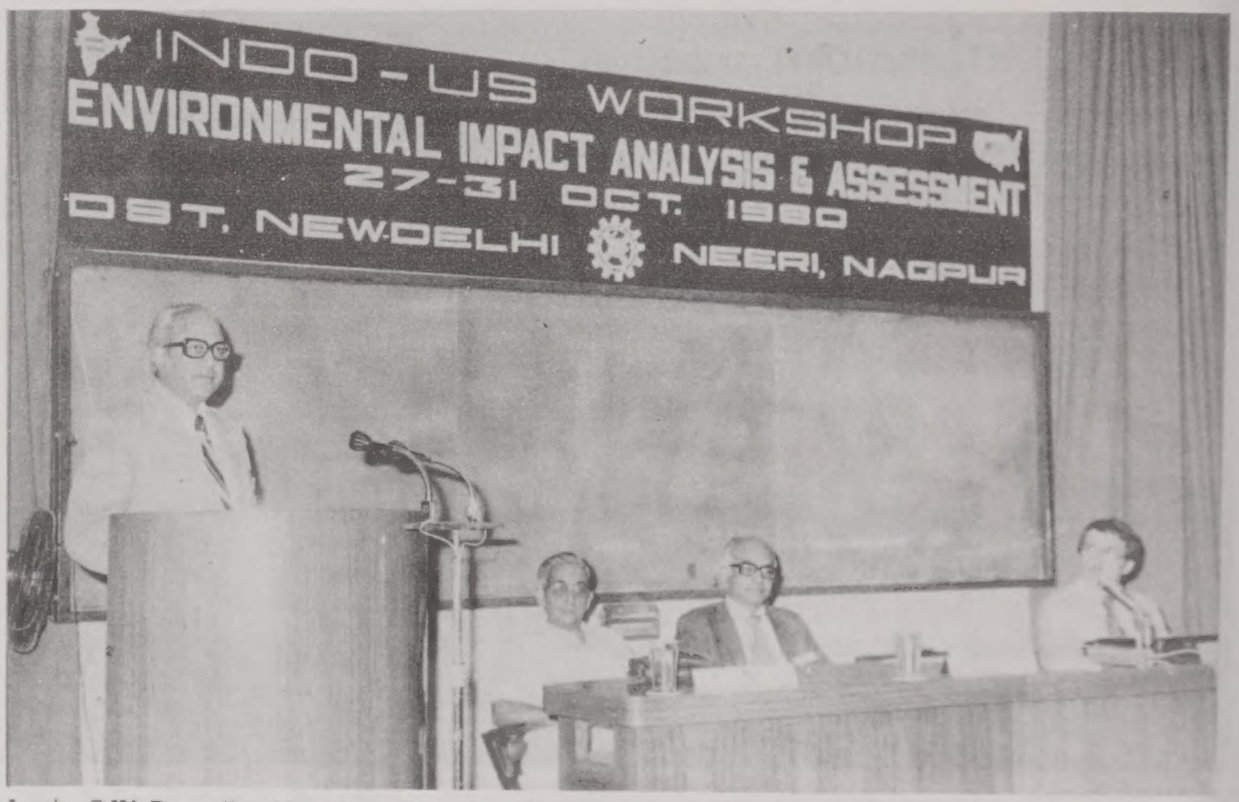
NPL had also arranged a workshop-cum-training programme for the developing countries. Eight countries and ten user organizations participated in the week-long programme which provided a forum for informal discussions on various aspects of time and frequency metrology.

As pointed out by the convener of the symposium, Dr B.S. Mathur, in his vote of thanks, the success of the symposium lay in the informal discussions between the participants from developed and developing countries. □

Indo-US Workshop on Environmental Impact Analysis and Assessment

The criterion for development of a country has always been in terms of economic growth aiming at generating more jobs, more food, more consumer goods, etc. Not only has this not always resulted in the improvement of the quality of life of the people, but, unwittingly, has led to the deterioration in the quality of environment. This is one of the observations made at the Indo-US workshop on Environmental Impact Analysis and Assessment held at the National Environmental Engineering Research Institute (NEERI), Nagpur, from 27 to 31 October 1980. The workshop, organized by NEERI and the Department of Science and Technology in collaboration with the Environmental Protection Agency (EPA) of USA, called for an assessment of the impac on environment, of a developmenta project before it is taken up fo implementation. That an environmenta impact statement should be provided b project sponsors while submittin project proposals with investment exceeding Rs 2500 million was th centrepiece recommendation the work shop made. Among the othe recommendations: (i) Preliminary en vironmental appraisal should be carried out in respect of all developmenta projects; (ii) information systems nec essary for carrying out environmenta impact analysis and assessment should be established and strengthened; and (iii) facilities for manpower development and training for carrying out the above tasks should be provided.

Identified at the workshop were 20 R&D project proposals which are of relevance to India and USA. These included: (i) impact assessment on ecology and biosources of selected multi-purpose projects, (ii) collection, transportation and disposal of solid and hazardous wastes; (iii) sewage sludge utilization as an alternative energy source; and (iv) environmental impact appraisal for industries like iron and steel, petroleum, and fertilizers.



Justice S.W. Puranik of Bombay High Court inaugurating the Indo-US workshop; seated on the dais are (*from left*): Dr N.L. Ramanathan, Director, DST; Dr B.B. Sundaresan, Director, NEERI; and Mr Henry Beal, Director of Standards and Regulations, USEPA

The workshop was attended by several experts in environmental science including six from USA, among whom were Mr Henry Beal, Director of Standards and Regulations, and Mr Thomas R. Sheekells, Deputy Director, EPA.

The workshop was inaugurated by Justice S.W. Puranik (Bombay High Court), who, in his address, stressed the need to create public awareness of the harmful effects of pollution and to safeguard the environment.

Inter-Country Meeting on Slow Sand Filtration

Twenty papers on slow sand filtration were presented and discussed by 35 delegates from seven developing countries, viz. Colombia, Ghana, India, Jamaica, Kenya, Sudan and Thailand at a meeting held at NEERI, Nagpur, from 15 to 19 September 1981. Mr V.P. Sathe, Union Minister for Information and Broadcasting, who inaugurated the meeting, stated that that a sum of Rs 100 crore had been provided for in the current budget for accelerating rural water supply. By the end of 1980-81, 25,000 more villages would be covered by protected water supply, he added.

NEERI's Director Dr B.B. Sundarsen described the salient features of the Slow Sand Filtration Project in India and also stated that NEERI had provided assistance to four state governments in the construction of demonstration plants one each at Abu Shehar (Haryana), Kamayagoundanpatti (Tamil Nadu), Burujwada (Maharashtra) and Pothunuru (Andhra Pradesh).

Dr J.M.G. Van Damme, Manager, WHO IRC, said that the slow sand filtration process was being promoted so that protected water supply could be provided to the rural areas at low cost. □

MEDICAL ULTRASONICS RESEARCH & DEVELOPMENT AT CSIO

R.S. KHANDPUR*

In recent times, ultrasound has become increasingly important in medicine as an imaging modality and has established itself along with X-rays and nuclear medicine as a diagnostic tool. Its main attraction lies in its non-invasive and non-traumatic character and ability to distinguish interfaces between soft tissues. Also, it is apparently safe at the acoustical intensities and duty cycles now used in diagnostic equipment. Diagnostic ultrasound is applied to obtaining images of almost the entire range of internal organs in the abdomen. These include kidney, liver, spleen, pancreas, bladder, major blood vessels, and foetus during pregnancy. It is also employed to present pictures of thyroid gland, eyes, breasts and a variety of other structures for detecting cysts, tumours or cancer. This is possible in situations where other diagnostic methods by themselves have been found to be either inapplicable, insufficient or hazardous. Ultrasonic studies which do not involve image formation have also been extensively developed to allow the dynamics of blood flow in the cardiovascular system to be investigated with a precision not previously possible.

The use of ultrasonics in medical practice depends upon the fact that body tissues and fluids have different acoustic impedances. When a searching ultrasonic beam encounters an interface between two dissimilar structures, part of the wave is reflected. The greater the variance in impedance, the higher is the intensity of the reflected energy. From a study of the reflected echoes, a diagnosis can be made about the type of structure the ultrasound beam encounters. Basically, two methods—the pulse-echo method and the Doppler shift technique—are used for making studies with ultrasonics. Both the methods have found applications in specific areas in the medical field.

The Central Scientific Instruments Organisation (CSIO), Chandigarh, which started work on the development of ultrasonic based medical instruments in 1969, has now emerged as the most advanced centre in this field in the country. A number of instruments have been developed and the technologies transferred to industry for their manufacture. Medical instruments require long periods of clinical trials covering a large number of patients with different symptoms and diseases. CSIO has received adequate clinical support from the medical staff of the Postgraduate Institute of Medical Education & Research, Chandigarh, in carrying out trials with the instruments developed. Some of the important instruments developed in the area of medical ultrasonics include echoencephaloscope, cardiotocograph, echocardioscope, ultrasonic sector scanner, foetus stethoscope, and blood flow monitor.

Echoencephaloscope

This is a neurodiagnostic instrument. Based on ultrasonic pulse echo technique, the instrument provides vital information on structural abnormalities such as brain tumours, hematomas, and excess fluid by determining the location of the brain mid-line. If the structures normally in the mid-position are displaced, the presence of some abnormality is indicated. Such cases can be easily detected by using this instrument. Before the advent of this instrument, skull X-rays, pneumoencephalograms and cerebral angiograms were the only techniques available for examining the brain. The echoencephaloscope is an additional diagnostic tool for neurologists, radiologists, neurosurgeons and emergency room personnel.

The echoencephaloscope developed at CSIO employs a two-probe method and incorporates three modes of operation, viz. single probe, through probe, and double probe. In the last mode of operation, the two probes are kept on the two sides of the skull and echoencephalograms thus obtained are

*Head of CSIO's Medical Electronic Instruments Division

displayed simultaneously, one below the other, on the screen. This method doubles the sensitivity of mid-line detection and enables one to make diagnosis quickly and accurately. The know-how of the instrument has been released to industry for commercial production.

Cardiotocograph

This is an extremely useful instrument for obstetrics and gynaecology departments in hospitals for monitoring foetal heart rate and labour activity. These two parameters, when studied simultaneously, give vital information on the status of the foetus and the mode of delivery to be followed.

The foetal heart rate is derived from the ultrasonic Doppler shift signal using a frequency of 2 MHz. The ultrasound is transmitted from a special transducer, which gives a wide-angled beam. It is possible to detect the foetal heart signals even though the foetus may be presenting some movements with respect to the transducer. A reliable signal is thus picked up and displayed as instantaneous rate on a digital panel meter.

The labour activity is indirectly measured using a strain gauge transducer placed on the abdomen and held in position with a strap. The method consists in converting the labour activity into an electrical signal, which is displayed, as millimetres of mercury pressure, on a digital panel meter. The information from these two signals can be recorded on a 2-channel recorder and the correlation of the two parameters makes possible diagnosis of distress cases.

Clinical trials on the instrument have been highly successful. The know-how of the instrument is being assigned to the National Research Development Corporation of India.

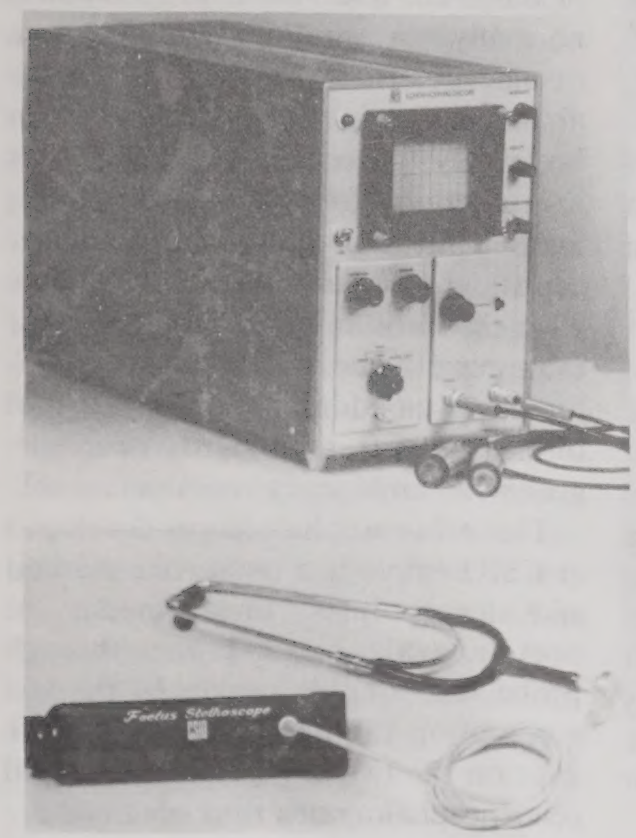
Echocardioscope

A fully engineered prototype of an echocardioscope has been developed. The instrument enables one to make positive diagnosis of a broad range of heart diseases in a non-invasive manner. A 2.5 MHz transducer is used to transmit ultrasonic pulses and to receive the echoes from the various structures of the heart. The echoes are electronically processed and are displayed on a CRT using the intensity modulation technique. The instrument incorporates a special circuitry for providing segmented time-gain compensation to study echoes from only such areas as are of interest. A provision to display A-mode, gain curve and M-mode informati has been made in the instrument. Oth cardiovascular parameters like EC PCG and pulse tracings can simultaneously displayed along with M mode for correlative studies.

The cardiac applications of th instrument include evaluation of mitr valve stenosis and prolapse, perfo mance of prosthetic and aortic valve detection of atrial septal defects, atri tumours, pericardial effusion an determination of ventricular con tractility. The instrument is unde clinical trials.

Ultrasonic Sector Scanner

A two-dimensional scanner enable one to have a cross-sectional image o the surfaces by moving the ultrasoni probe on the area of interest. Severa techniques are used to achieve scanning In recent years, real-time scanners have assumed greater importance than the static scanners because the former provide dynamic images of the organs under investigation. Two-dimensiona images are created by continuously sweeping an ultrasonic beam through a chosen sector of the portion of the body and displaying the resultant image on a display monitor. A sector scanning system, in which the chosen sector of the



CSIO's medical ultrasonic instruments: 1. echoencephaloscope, 2. cardiotocograph, 3. blood flow monitor, 4. foetus stethoscope, and 5. echocardioscope

dy is scanned by angling rapidly a ngle transducer, is under development. is a sophisticated system involving ecision mechanical design not only for cking the crystal, but also for curately locating the position of the ansducer and that of the echoes iginating from within various strucres of the body

oetus Monitor and Foetus Stethoscope

A battery-operated foetus monitor ased on the Doppler shift principle has een developed. This instrument enbles one to detect foetal heart as early s the 10th week of pregnancy as also wins, and, in some cases, the presence f placenta previa. The know-how of the oetus monitor has been transferred to ndustry, and a large number of the nstruments based on the CSIO design re in use in hospitals.

Based on the same principle a foetus tethoscope has been developed. The nstrument works on rechargeable cells nd can be carried in the pocket. The nformation received from the foetal eart is converted to audio form and eard through the earphones. The nstrument operates at 2.5 MHz. The now-how of this instrument has been xploited by three manufacturers.

Blood Flow Monitor

Instruments based on ultrasonic Doppler shift are also used for detecting and measuring blood flow in the arterial network to investigate a variety of diseases. They are also used to detect deep-vein thrombosis. The CSIO's blood flow monitor operates at 7.5 MHz. The instrument, which makes use of a pencil probe, can easily detect flow in the superficial blood-carrying vessels.

Future Work

With the technical base already well established, CSIO proposes to take up the development of high-resolution scanners in the very near future. Resolution is an important parameter while one looks for finer structures as in the detection of cancer in its very early

Ultrasonic sector scanner under assembly and test; and block diagram of the scanner

stage or detection of retinal detachment in the eye. Scanners used for these applications make use of high frequencies, and, therefore, require careful signal processing. The laboratory proposes to develop linear array high-resolution scanners as they offer the advantage of employing stationary transudcers, and at the same time give resolution within acceptable limits.

Although a simple blood flow monitor has been developed to determine the potency of the peripheral arterial system, it requires extensive work to quantitatively measure the blood flow in various parts of the peripheral and circulatory system. Instruments based on range-gated Doppler imaging technique have been developed abroad for computing blood flow in carotid and femoral artery. This will be another project on which work is proposed to be undertaken in the laboratory.

Medical ultrasonics forms just one of the activities of the Medical Electronic Instruments Division, which also has some other prestigious on-going projects like the development of a dialysis machine, implantable pacemakers, patient monitoring instruments, and automated biochemical analysis systems. □

Conference Briefs

Shri A.K. Bose of the Central Mining Research Station (CMRS), Dhanbad, attended a workshop on Environmental Implications and Strategies for Expanded Coal Utilization, held at Moscow during 20-24 October 1980. The workshop was organized by UNEP, Beijer Institute, Sweden, and UNEPCOM, Moscow. Shri Bose presented a paper (co-author: Shri S.K. Bose) entitled 'Coal expansion in India—environmental implications of small-scale utilization'; which dealt with Indian coal resources, mining and utilization scenario, environmental studies in Jharia coalfields and implications of its expansion. It also discussed the use of high-sulphur and high-ash coals in power generators and substitution of soft coke by developing new technologies.

Sixty-five or so experts, including 25 from USSR, participated in the workshop. Based on the deliberations at the workshop, UNEP would prepare a final document that would cover all the aspects of expanded coal utilization and environmental impacts in different countries with remedial measures needed with such expansions. □

PROGRESS REPORTS

SERC Annual Report: 1979-80

Survey and evaluation of low-cost housing techniques, development of prestressed concrete and ferrocement structures, and computer programming for evaluating structural behaviour, were some of the main areas of work of the Structural Engineering Research Centre (SERC), Madras, during 1979-80, according to its annual report published recently.

At the instance of the Department of Atomic Energy, SERC carried out tests on the containment vessel of the Madras Atomic Power Project at Kalpakkam to assess its structural behaviour under internal pressure. Also taken up at the instance of DAE were two other projects: (i) stress analysis of tube sheets, and (ii) effect of imperfections resulting from fabrication of calandria shells. A study of the torsional stiffness of the azimuth tube of a 14 m MCF steerable antenna was carried out for the Space Applications Centre by employing holographic interferometry techniques.

At the request of the Hindustan Shipyard Ltd, Visakhapatnam, the centre took up the development of computer software for the analysis and design of ship structures.

Computer programs were developed for the analysis of thick shells using parabolic and cubic finite elements. A prismatic linear analysis program (PRLN) and a non-linear analysis program (FRAME-63) were implemented during the year. Computer programs were also developed for the limit state design of reinforced concrete chimneys and box-girder bridges with non-prismatic cross-sections. Work on elastomeric bridge bearings was continued and different sets of samples of natural rubber pads were tested and their relative merits assessed. An analytical method for predicting the strength of partially prestressed beams under combined bending, torsion and shear was developed.

Accurate methods of analysis of rotationally symmetric, thin-walled structures were developed.

Under a project sponsored by the Department of Science and Technology, two ferrocement gas holders suitable for a plant of 2 m^3 capacity were cast, one with the central guide system and the other with the side guide system. Coatings of commercially available polyurethane coatings were found effective in making the gas holder leak-proof against gas. A preliminary design of a gas holder suitable for 6 m^3 pla was made.

With a view to developing ferroc ment folded plate roofing units, SER designed and tested units of 3 m spa On the basis of experimental obse vations, certain modifications to t geometry as also to the reinforceme were made. The improved design mad use of a combination of GI wire an hexagonal mesh, as skeletal an distributed reinforcement respectivel The units were provided with joint which were not monolithic and neede no *in situ* filling, but were completel water-tight. Roofing units for spans o up to 6 m were under development.

Preliminary studies relating to th optimization of overhead water tank and development of knock-down type GI sheet grain storage bins were completed. Computer programs were developed for shell-type water tanks. A transducer for measuring pressures underneath raft foundations of buildings was also developed and tested.

Work on the development of indigenous technology for the manufacture of prestressed concrete pipes was continued and different compacting methods such as spinning, vacuum process, and high frequency vibration were studied. Tests on plate floors were completed and a movable form for casting *in situ* RCC portals was developed. A full-scale test on a model of the space-grid roof developed earlier was also completed.

The centre brought out a compendium entitled 'Design of low-cost houses' (Vol. 1) on the basis of the survey and evaluation of low-cost housing techniques in the southern states and in the union territories of Pondicherry and Goa. A self-help prefabrication system suitable for low-cost housing and using precast reinforced concrete components was also developed. A draft guide-book on the setting up of small-scale industries for the manufacture of concrete products was also brought out.

Twenty-four papers were published and 21 were presented in seminars. □

PROCESSES AND PRODUCTS READY FOR COMMERCIAL UTILIZATION

Ammonium Persulphate

e Central Electrochemical Research titute (CECRI), Karaikudi, has veloped an electrochemical process the manufacture of ammonium sulphate, a chemical which finds use a polymerization catalyst in rubber d plastic industries, and also appli-ions in textile industry.

The process, worked out on a bench le, consists in the electrolysis of an ueous solution of ammonium sul-ate and sulphuric acid using an anode platinum and a cathode of lead. The mperature of the cell is controlled by culating cold water through it. The odic current density is maintained at 0 A/dm^2.

The main raw materials required in e process are ammonium sulphate and phuric acid, both of which are ailable in the country.

All the items of equipment required in e process are available indigenously, d include: rectifier, platinum, elec-olytic cell (FRP/PVC), feed tanker, orage tank, reaction vessel, filtrate ceiver tank, centrifuge, vacuum drier, aporator, boiler, refrigerator, and VC pump.

The capacity of an economically able unit as suggested by CECRI is 90 nnes/annum. It is estimated that a tal investment of Rs 21.00 lakh, mprising a fixed capital on building of s 2.50 lakh, a fixed capital on plant of s 15.92 lakh and a working capital of s 2.63 lakh, will be required to put up ch a unit. The cost of production has en worked out to be Rs 13.50/kg.

The process (NRDC Process No. 851-2-80) is available through the National esearch Development Corporation of dia (61 Ring Road, Lajpat Nagar III, ew Delhi 110024) from whom further tails may be obtained. □

Multi-test Instrument

With a view to achieving economy in rms of both cost and space, the Central Scientific Instruments Organisation (CSIO), Chandigarh, has designed a multi-test instrument which incorporates a digital multimeter, a frequency counter, a function generator and a dc regulated power supply. A compact and low-cost testing facility in electronics research and development, it finds wide use in research and educational institutions and industries.

The design is based on LSI technology. A prototype fabricated by CSIO has undergone extensive tests and its performance found satisfactory.

The components needed for the manufacture of the instrument are LSI, integrated circuits, transistors, diodes, FETs, crystals, resistors, capacitors, potentiometers, connectors, switches, LED display, transformers, PCB, and other hardware items. The LSI and some of the integrated circuits may have to be imported. Test equipment required are: oscilloscope, frequency counter, precision digital multimeter, LCR bridge, distortion factor meter, IC tester, transistor tester, avometers, etc. Facilities for making chassis, painting, etc. will be needed.

The annual demand for the instrument, as estimated by CSIO, is 1000 pieces. A fixed capital (excluding land and building) of Rs 50,000 would be required for setting up a unit; the working capital required for manufacturing 200 pieces annually is about Rs 2.5 lakh.

The terms for transfer of know-how are: lump sum premium, Rs 6000; recurring royalty, $2\frac{1}{3}$%; nature of licence, non-exclusive; and period of licence, 5 years. □

PATENTS INFORMATION

Indian Pat. 520/Del/77*

A process for making molecular sieve zeolites from paddy husk

M.C. UPRETI, S.N. DUTTA, B.C BORTHAKUR & G.C. BHATTACHARYYA
Regional Research Laboratory, Jorhat

Molecular sieves are porous crystalline aluminosilicates of the zeolite mineral group, and have emerged as a new class of efficient adsorbents and catalysts. These can be regenerated readily, show high water adsorption capacity even at very low humidity, and have a longer life as compared to the alternative materials such as active alumina, active carbon and silica gel. Also, corrosion, fouling, safety and material handling problems invariably associated with the wet processes such as scrubbing, extraction or absorption are virtually absent in the case of molecular sieves.

Molecular sieves find various applications in chemical, petrochemical and gas industries as adsorbent for desiccation, drying, bulk separation and recovery of gases and liquids. Molecular sieves are also used as

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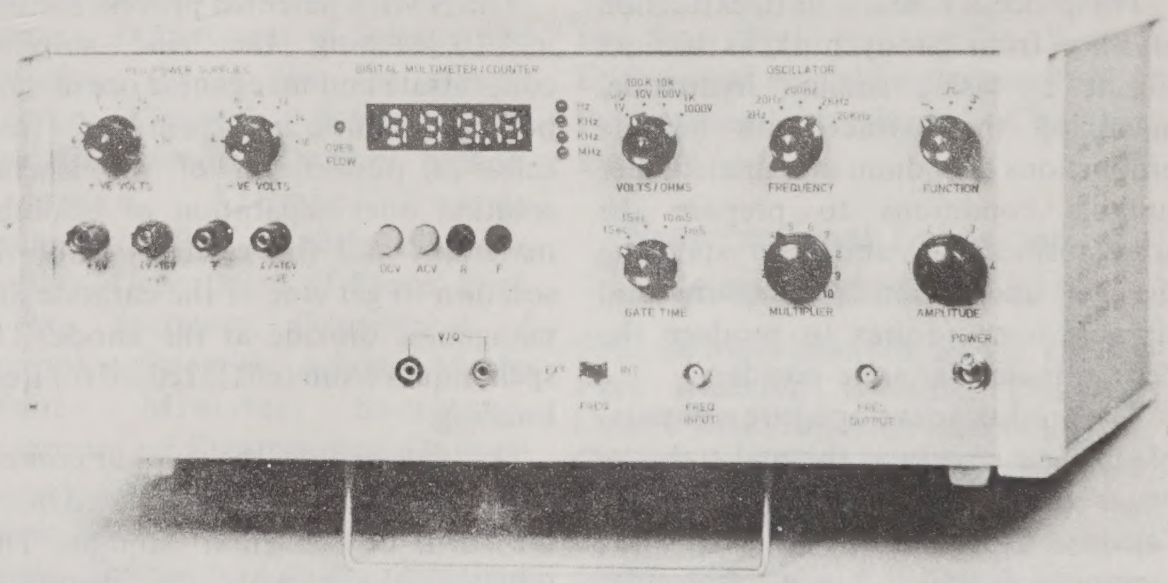

Multi-test instrument developed by CSIO

catalysts and catalyst supports in several chemical and petrochemical processes. Owing to their high activity and better product selectivity molecular sieve catalysts are now being used in modern petrochemical industries in place of the conventional silica-alumina catalysts.

Molecular sieves are normally prepared from highly alkaline heterogeneous aluminosilicate gels obtained by mixing various silica and alumina containing substances. Several types of molecular sieves have been synthesized and characterized by their chemical composition, crystal structure, pore size and other physicochemical properties. Most of the information regarding their synthesis, however, is guarded by patents. The most frequently used molecular sieves available commercially are type A, type X and type Y of the Linde Division of Union Carbide Corporation (USA).

The process, covered by the patent, is the result of developmental work undertaken by the Regional Research Laboratory, Jorhat, to synthesize molecular sieves from indigenous sources. The raw material chosen is paddy husk, a cheap agro-industrial waste, which contains, besides lignin and cellulose, 15-20% by weight of ash which is almost pure silica. The nature of the silica present in paddy husk is not clearly known. The process covers the synthesis of molecular sieves of type A and X in which paddy husk is used as the source of silica.

The process consists in (i) extraction of silica from paddy husk as sodium silicate by using sodium hydroxide, (ii) mixing the extract with definite proportions of sodium aluminate under suitable conditions to prepare the aluminosilicate gel, and (iii) crystallizing the gel under normal pressure and suitable temperatures to produce the desired molecular sieve powder.

The products developed are comparable in their structure, thermal stability, water adsorption and molecular separation characteristics with the commercial-grade Linde molecular sieves.

Based upon pilot plant investigations and cost estimates of the process, a 30 tonnes/annum plant is recommended for commercial production. The process has been referred to the National Research Development Corporation of India for commercial utilization. □

Indian Pat. 521/Del/77*

An improved process for simultaneous electrolytic production of zinc metal and manganese dioxide from zinc sulphide concentrate and manganese ores

V.A. ALTEKAR, A.M. PANDE & K.N. GUPTA
National Metallurgical Laboratory, Jamshedpur

In the process covered by the patent, both electrolytic zinc metal and manganese dioxide are produced in a single cell directly from zinc concentrate and manganese ore in one process, whereas in conventional processes, zinc metal and manganese dioxide are produced from two different processes. Zinc metal extraction involves: (i) oxidation of the zinc sulphide concentrate in a flash/fluidized roaster, (ii) leaching of the resulting zinc oxide in sulphuric acid/spent liquor from cells, and (iii) electrolysis, after purification, of the leached solution to obtain zinc metal at the cathode. Manganese dioxide (electrolytic) production involves: (i) giving a reducing roast to the manganese ore to convert the naturally occurring acid-insoluble MnO_2 to acid-soluble MnO, (ii) leaching of the reduced mass in sulphuric acid/spent liquor from cells, and (iii) electrolysis, after purification, of the leached solution at 90°C to obtain MnO_2 at the anode.

The NML's patented process consists in: (i) leaching the zinc sulphide concentrate and manganese ore in a hot boiling sulphuric acid/spent liquor from cells; (ii) purification of the leached solution after separation of insoluble materials; and (iii) electrolysis of the solution to get zinc at the cathode and manganese dioxide at the anode. The spent liquor from cells is reused for fresh leaching.

During leaching, the sulphur content of the zinc sulphide is precipitated out in the form of elemental sulphur. This remains along with the insolubles during leaching. By a simple distill the precipitated sulphur is reco from the sludge.

*Accepted

PATENTS FILED

844/Del/80: Improvement in relating to roll cladding with partic reference to that of stainless stee aluminium sheet, J. Bhattacharya, Ghose & S.K. Banerjee—N Jamshedpur.

900/Del/80: Improved process for conversion of toluene to xylenes, Kulkarni, P. Ratnasamy, A Kotasthane, A.J. Chandwadkar, C Babu & K.H. Chandavar—NCL, P

921/Del/80: Improvements in relating to the design of cell in cathodic reduction of nitro compou to amino compounds, H.V.K. Udu M.S. Venkatachalapathy, S Chidambaram, K. Srinivasan—CEC Karaikudi.

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934/Del/80: A device for continuo separation of lighter fraction fro heavier fractions of decorticated grai using a liquid system, A.B. Afzalalpu kar & G. Lakshminarayana—RR Hyderabad.

935/Del/80: A process for th synthesis of substituted 3,5-dihalo-4 aminosalicylanilides, S.K. Dubey, H Singh, S. Sharma, R.N. Iyer, J.C Katiyar, A.B. Sen, (Miss) S. Gupta & Ram—CDRI, Lucknow.

936/Del/80: A process for th synthesis of substituted-3,5-dihaloisc thiocyanatosalicylanilides, S.K. Dube H. Singh, S. Sharma, R.N. Iyer, J.C Katiyar, A.B. Sen, (Miss) S. Gupta & Ram—CDRI, Lucknow. □

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